Counter Underground Facility Program

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A large number of countries use underground facilities (UGF) for military purposes supporting both tactical and strategic uses, including the production and storage of weapons of mass destruction, ballistic missile basing, leadership protection, and top echelon command and control sites. The Counter Underground Facility (CUGF) Program is focused on improving the Defense Department's capability of holding threat UGFs at risk by improving techniques and technologies that provide critical information on the timeliness of an attack, facility vulnerabilities, and post-attack battle damage assessment (BDA).

Program Objectives:

- Identify UGF function
- Evaluate UGF occupancy and pace of activity
- Locate critical support systems such as power, water, and ventilation
- Determine the orientation and depth of structure
- Characterize facility attributes with sufficient detail and accuracy to support physical and functional defeat
- Monitor facility immediately before, during, and post-attack to support evaluation of UGF attack effectiveness

The goals of the CUGF program have placed emphasis on two primary approaches: passive acoustic, seismic, and electromagnetic (PASEM) monitoring; and characterization of UGFs by the use of effluents. For each of these sensing technologies, DARPA is developing and validating robust modeling capabilities for predicting signals associated with normal UGF operations.

The initial modeling and concept exploration efforts for PASEM and effluents have resulted in a follow-on activity directed at development and initial evaluation of innovative methods and designs for detection and exploitation of UGF-related observables, ranging from the tactical use of caves to strategic-level UGFs. For additional information refer to DARPA BAA 02-04.

For PASEM observables, DARPA has determined that present State-of-the-Art sensors perform at or below background noise levels for seismic and acoustic sensors. Small, field-deployable magnetic- and electric-field sensors, however, are not background noise limited. DARPA is supporting the development of new, improved deployable electric- and magnetic-field sensors.

3-Axis Electric-Field Sensor
(Developed by Quasar)
~1μV/m/√Hz @ 60 Hz, 0.6 μV/m/√Hz @ 180 Hz
Bandwidth: 1mHz – 100kHz